Designing Interactive Systems I

Introduction to the Course

Prof. Dr. Jan Borchers
Media Computing Group
RWTH Aachen University

Winter term 2018/19

http://hci.rwth-aachen.de/dis

Who am I?

- Studied CS at Karlsruhe (& Imperial)
  - Human-Computer Interaction
- PhD CS, TU Darmstadt (& Linz, Ulm)
  - Interaction with multimedia
  - HCI design patterns
- Assistant professor at Stanford & ETH Zurich
  - Interactive rooms
  - Ubicomp user interfaces
- Full professor at RWTH since Oct. 2003
  - Interaction with audio & video
  - Wearable & Tangible UIs, Personal Fabrication, IDEs,…

Our Team

Krishna Subramanian, M. Sc.
krishna@cs.rwth-aachen.de

Adrian Wagner, M. Sc.
wagner@cs.rwth-aachen.de

They answer all your questions!

Please add this subject line to your mail: “**[DIS1]**”

Human–Computer Interaction?

Fac 0 0 | Order# 99004234 | New 99031927 | Report Selection (Prin Vie Fax EMai) | OCB | SSF View | Dupe Load | View Invent | Routing Sheet | Print Bill | Call Log | Cancelled

CUST

Caller JOE | Quote 0
Phn [redacted] | Unknown Shipper:
Terms: Prepaid / Collect / 3rd Party | STD
Cust: Hi Fo Holdings, Ltd. | HIFO
Inv: Hi Fo Holdings, Ltd. | HIFO

PICK-UP

At: Hi Fo Holdings, Ltd. | HIFO
Add: 1125 [redacted] STREET SUITE 1200
CSPC VANCOUVER BC V6Z2K8
Ph: [redacted] Fax:
Cont: Est P/U:
Appointment: D: 06-10-02 F: T:

CONSIGNEE

Cons: CANADIAN HARDWARE & H
Add: [redacted] AVENUE SUITE 101
CSPC SCARBOROUGH ON M1B5M4
Ph: [redacted] x Fax: (41[redacted]2
Cont: VM:
Appointment: D: F: T:

COD $0.00 | Driver Collect
Fee $0.00 | Fee Collect

Mode: Air | From SC: ADT | To SC: ADT

Tariff: CAXR9-00-01
Service: 2D D 194
From: YVR
To: YYZ
Deliver By: 06-12-02 17:00
Clock Stop:

Miles	P/U Miles	Del Miles
0	0	0

Broker / Customs Agent
Broker:
Value: 0.00 In: USD
Notified:

Verbal Pod
Notify on POD
Hazmat:

Find CAX#
CAX#: 100670861
Shpr Ref:
B/L:
PO#:
GBL Num:
Cons Ref:
Billing Ref:
Ref 5:
MasterID: 0
MAWB:
Statement: 0
Hold P/U:

Non-Freight:
Manifest Hold:
Print Hold
Rate

SAVED

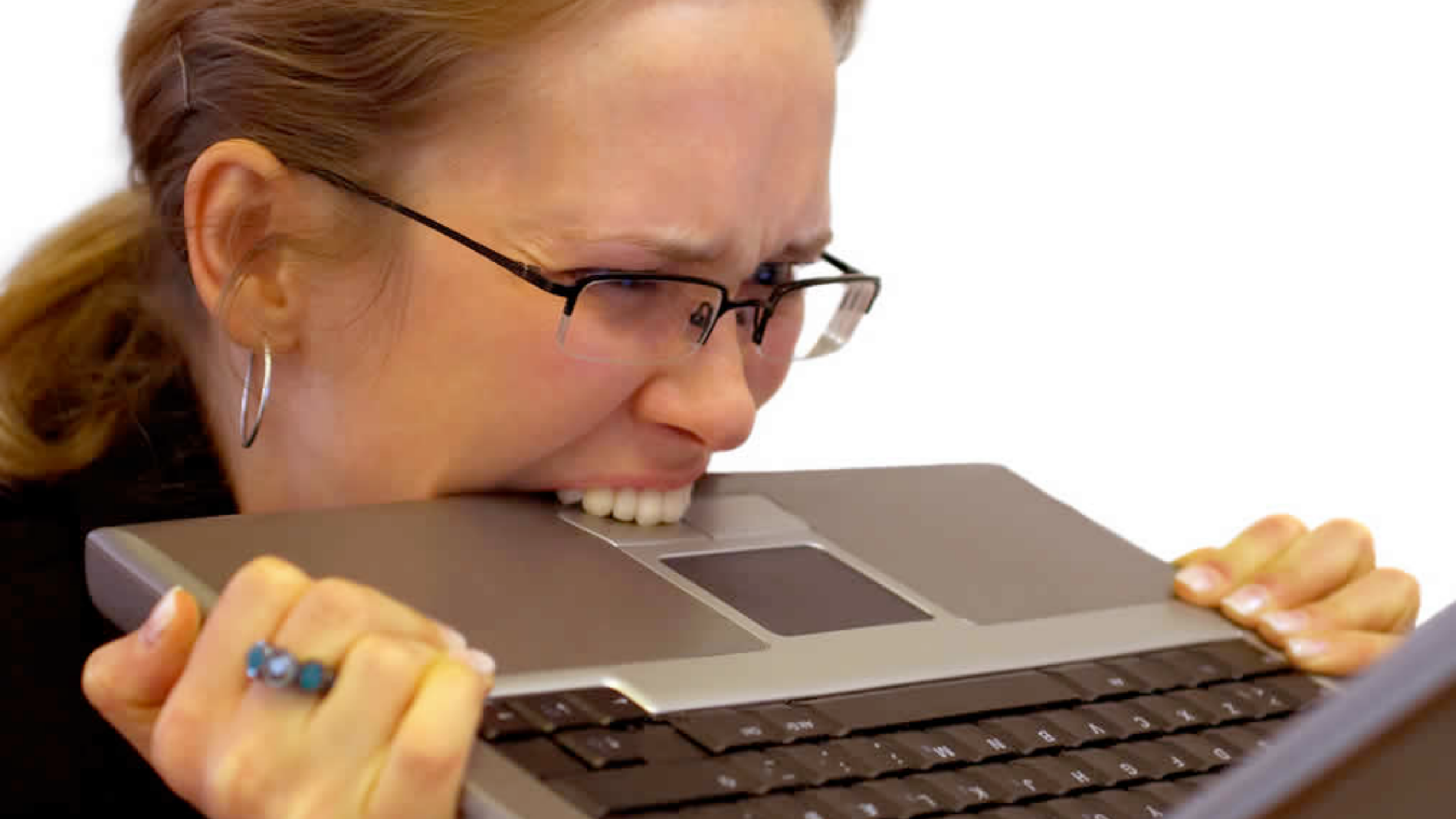
Charges:	761.50
Discount:	0%
SubTotal:	761.50
Accessorial:	40.00
DV: 0	0.00
FSC: CAX 2.50%	38.08
Total:	839.58
Balance:	839.58

Addend
Closed
Post

SPEC DISP

CUST NOTE | INV

Units | Type | H | Description | Stated | ActWT | Dimensions | ChgWt | Rate | Charges



Usability Sells!

350,000

DVD Player (1996)

1,000,000

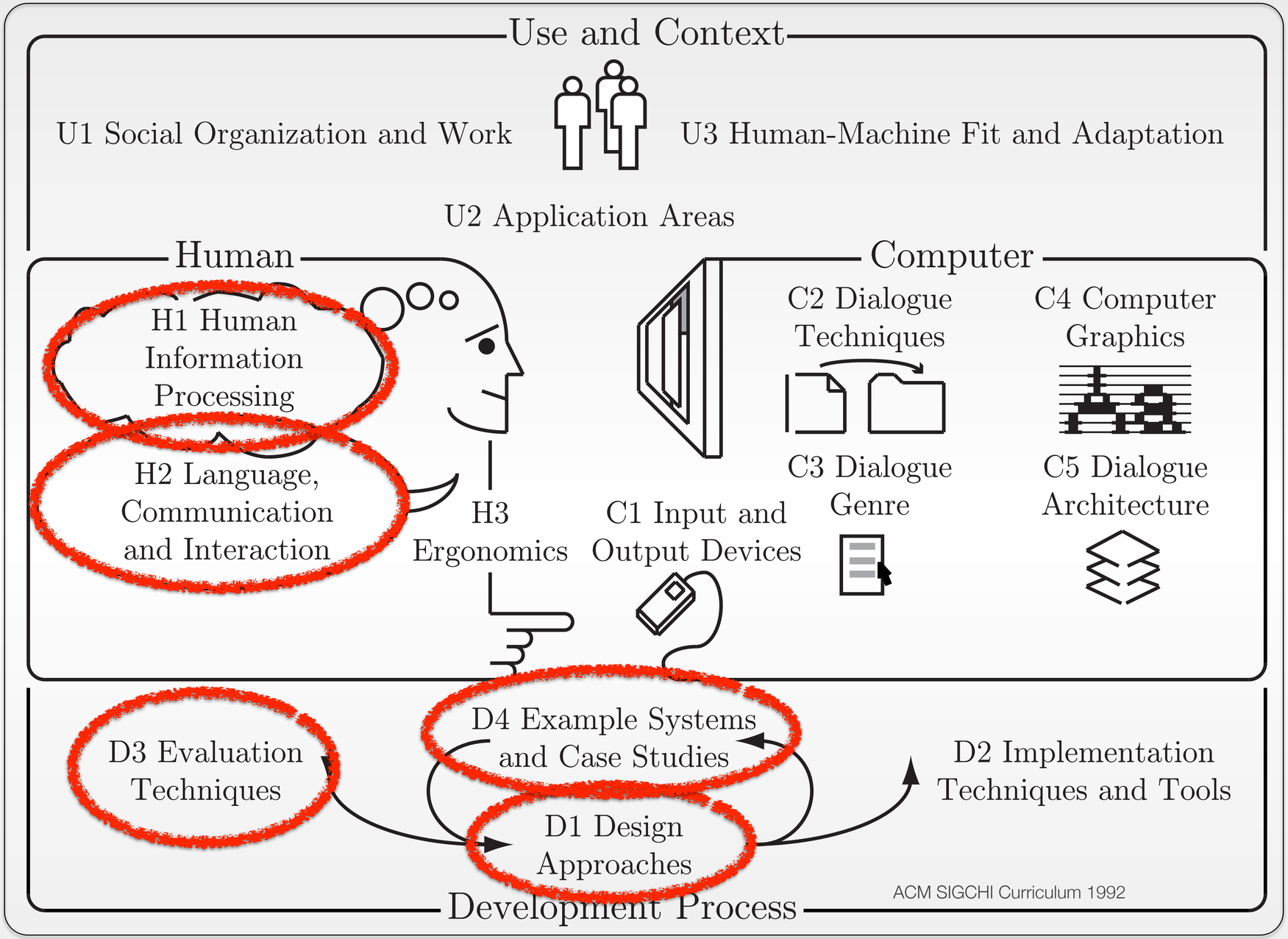
iPhone (1st Q’07)

3,000,000

iPad (1st 80d ’10)

Source: CNBC

What is HCI?



Class Topics

Human

- Performance
- Models of interaction
  - Affordances
  - Mappings
  - Constraints
  - Types of knowledge
  - Errors
- Design principles

Case Studies

- History of HCI
- Visions
- Phases of Technology

Development Process

- Iterative design
- User observation
- Ideation
- Prototyping
- User studies and evaluation
- Interaction design notation

Schedule

(1/2)

Complete schedule:
http://hci.rwth-aachen.de/dis

Date	Type	Content	Course Content for the Week (as Video and Slides)
10.10.18	Studio	Course Introduction Introduction to S01	S01 Fitts Law & CMN Model
15.10.18	Lab	S01 discussion; Introduction to S02 **Assignment 1: Fitts' Law out**	S02 Gestalt Laws, Information Content, Visibility, and Affordances
17.10.18	Studio	Students work on Assignment 1 in Studio	
22.10.18	Lab	S02 discussion; Introduction to S03 Assignment 1 discussion **Assignment 2: Gestalt Laws, Affordances, and Signifiers out**	S03 Mappings, Constraints, Seven Stages of Actions
24.10.18	Studio	Students work on Assignment 2 in Studio	
29.10.18	Lab	S03 discussion; Introduction to S04 Assignment 2 discussion **Assignment 3: Mappings, Constraints, and the Seven Stages of Action out**	S04 Knowledge in the World and Head, Mistakes and Slips.
31.10.18	Studio	Students work on Assignment 3 in Studio	
05.11.18	Lab	S04 discussion; Introduction to S05 Assignment 3 discussion **Assignment 4: Knowledge in the World and Head, Mistakes, and Slips out**	
07.11.18	Studio	Students work on Assignment 4 in Studio	S05 History of HCI 1
12.11.18	Lab	S05 discussion; Introduction to S06 Assignment 4 discussion **Assignment 5: Evolution of Interaction Design out**	S06 History of HCI 2
14.11.18	Studio	Lecture: Typography by Prof. Borchers	
19.11.18	Lab	S06 discussion; Midterm exam preparation Assignment 5 discussion	-
21.11.18	Studio	"Objectified" documentary	
26.11.18		(No Lab)	
28.11.18		**1st Chance Midterm Exam (S01–06, Typography)**	

Schedule

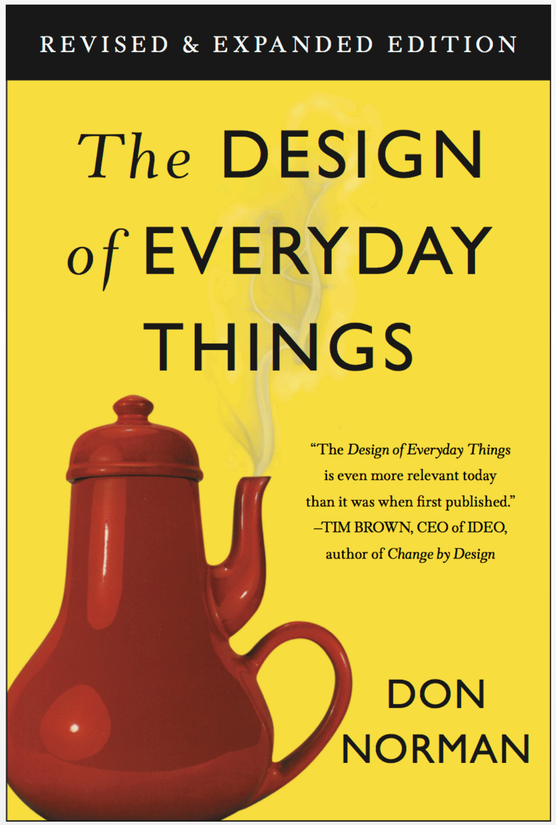
(2/2)

28.11.18	**1st Chance Midterm Exam (S01–06, Typography)**		
03.12.18	Lab	Midterm exam discussion; Introduction to S07 **Project Milestone #1: Problem Definition out**	S07 DIA Cycle, Observing Users, Brainstorming, and Storyboards
05.12.18	Studio	Work on project milestone #1 in Studio	
10.12.18	Lab	S07 discussion; Introduction to S08 **Project Milestone #2: Ideation - Phase I out**	S08 Prototyping
12.12.18	Studio	Work on project milestone #2 in Studio	
17.12.18	Lab	S08 discussion; Introduction to S09 **Project Milestone #3: Ideation - Phase II out**	S09 Evaluation
19.12.18	Studio	Work on project milestone #3 in Studio	
07.01.19	Lab	S09 discussion; Introduction to S10 **Project Milestone #4: Low-Fidelity Prototypes out**	S10 Responsiveness, GOMS Model, Interface Efficiency, and Golden Rules of Design
09.01.19	Studio	Work on project milestone #4 in Studio	
14.01.18	Lab	S10 discussion; Introduction to S11 **Project Milestone #5: Evaluation of Low-Fidelity Prototypes out**	S11 Notations I: Grammars and STNs
16.01.19	Studio	Work on project milestone #5 in Studio	
21.01.18	Lab	S11 discussion; Introduction to S12 **Project Milestone #6: Video Prototype and Presentation out**	S12 Notations II: Petri Nets, State Charts, and Design in Business
23.01.19	Studio	Work on project milestone #6 in Studio	
28.01.18	Lab	S12 discussion and final exam preparation	-
30.01.19	**Project Presentations**		
TBA	**Final Exam (1st Chance)**		
TBA	**2nd Chance Exams (Midterm and Final)**		

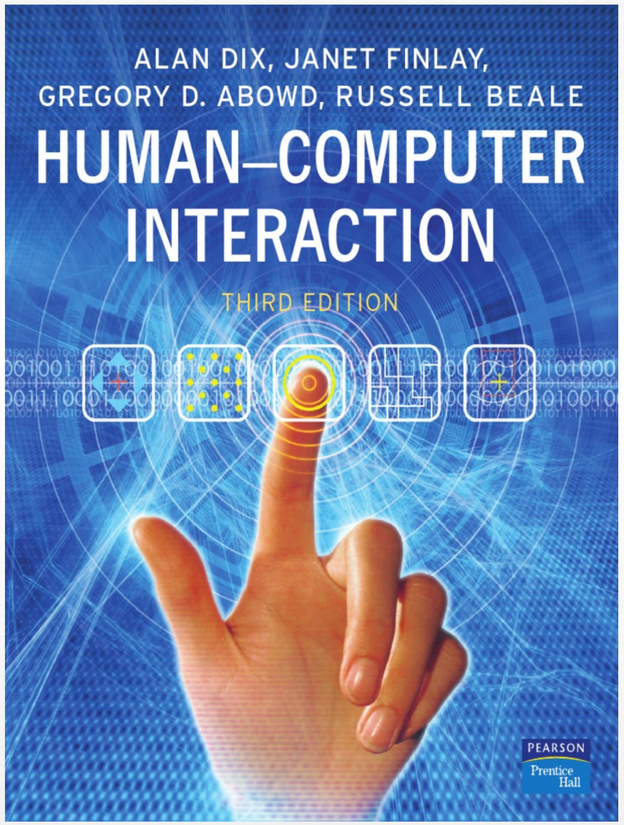
Complete schedule:
http://hci.rwth-aachen.de/dis

Textbooks

Required Read



Recommended Read



Media Computing Group

Our Classes

When?	Type	Credits (ECTS)	Name
SS, WS	**P**	**7**	**The Media Computing Project**
SS	S	4	Post-Desktop User Interfaces
SS	V/Ü	6	Current Topics in HCI
WS	**V/Ü**	**6**	**iOS Application Development**
SS	V/Ü	6	Designing Interactive Systems II
WS	**V/Ü**	**6**	**Designing Interactive Systems I**
		Only for B.Sc. students	
WS	**PS**	**4**	**Human-Computer Interaction**
SS	SW-Pr	7	M3: Multimodal Media Madness

Course: iOS Application Development

- Dates
  - Tue., 10:30 – 11:45, Room 2222 (start: 09.10.) and Mon., 14:30 – 16:00, Room 2222 (start: 22.10.)
- 6 ECTS credits
- Lecture (5 weeks) + Seminar (4 weeks) + Project (6 weeks)
  - http://hci.rwth-aachen.de/ios
- Registration deadline: 23:59, **today!**

iOS Application Development: Topics

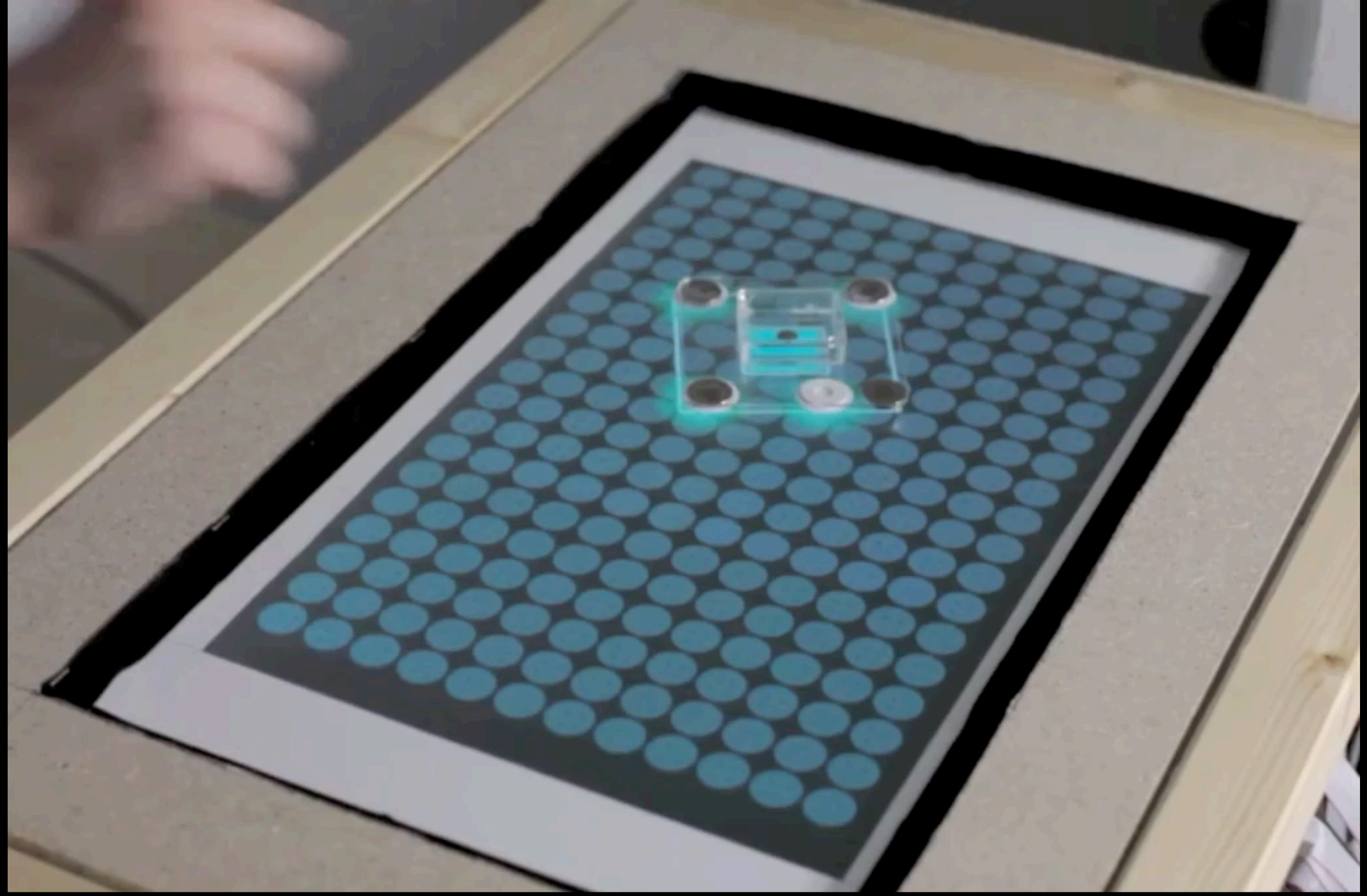
- Mobile application design principles
- iOS development basics
- Swift 4
- View Controllers & Dialogs
- Input techniques
- Networking
- Multimedia
- Performance tweaking
- iPad programming

PowerSocket

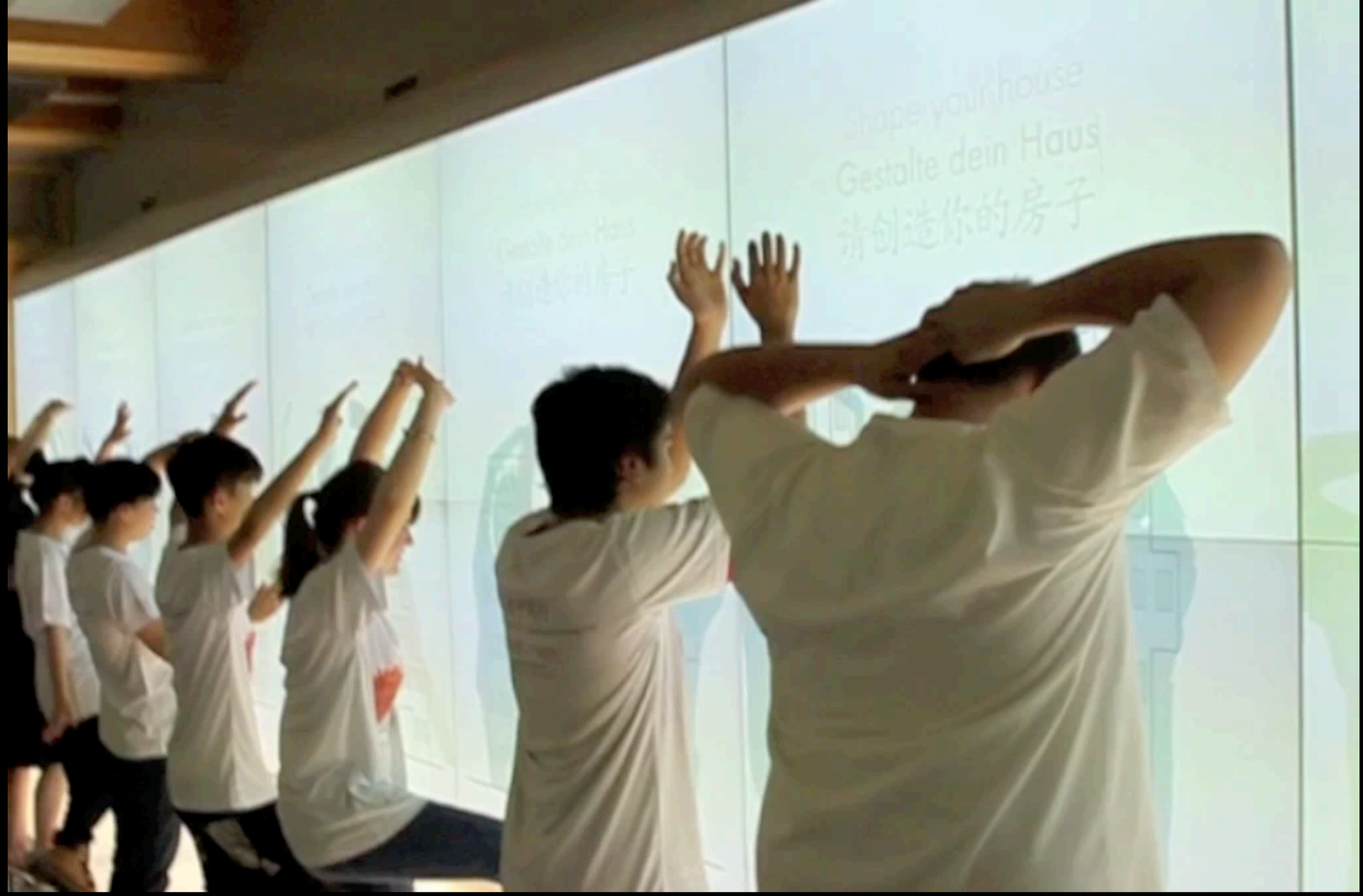
Smart Outlets

Florian

Tabletop Tower Defense
http://hci.rwth-aachen.de/moellers



Madgets
http://hci.rwth-aachen.de/madgets



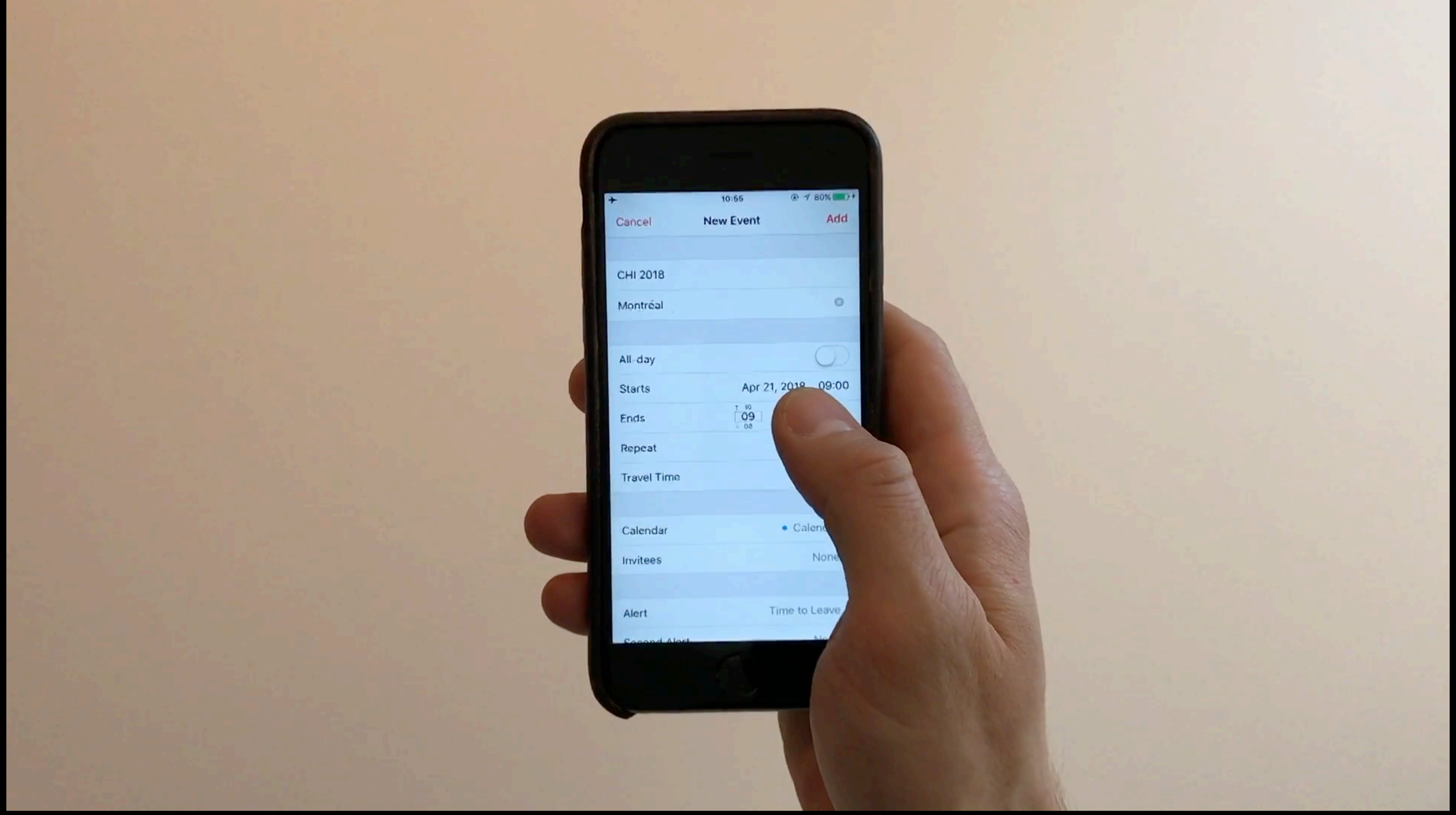
Silhouettes at EXPO 2010, Shanghai
http://hci.rwth-aachen.de/expo

640x480 Depth Image

Depth Sensor

HaptiVest
http://hci.rwth-aachen.de/haptivest

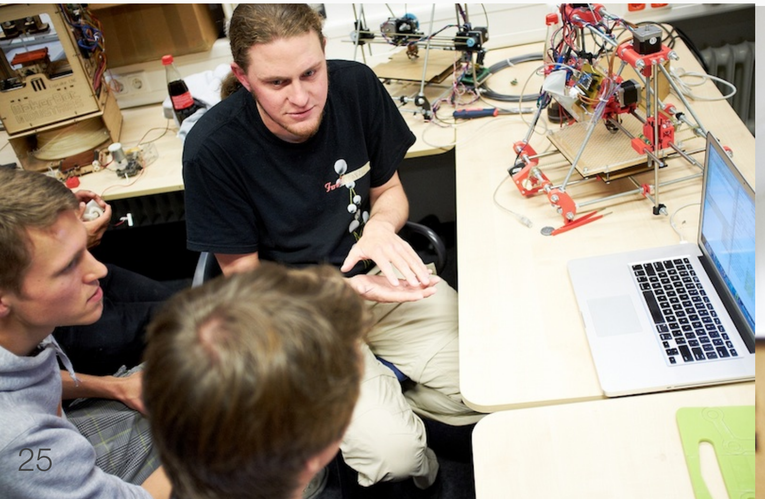
Sketch&Stitch
https://hci.rwth-aachen.de/sketch&stitch



ForcePicker
https://hci.rwth-aachen.de/forcepicker

Aachen Maker Meetup

- People doing strange things with electricity in Aachen
- Monthly, 3rd Wednesday of the month.
  Next meetup: Wednesday, **Oct. 17, 18:30** (Room 2222)
- https://www.meetup.com/Aachen-Maker-Meetup/




CocoaHeads Aachen

- CocoaHeads: International meet-ups about Apple's Cocoa Framework for macOS and iOS

- Monthly, last Thursday of the month.
  Next event: **Oct. 25, 19:00** (Room 2222)

- http://www.cocoaheads.de

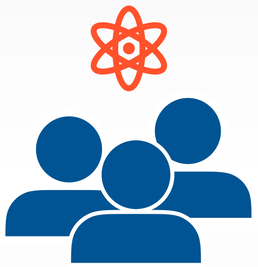
DIS 1: Class Structure

Flipped Classroom

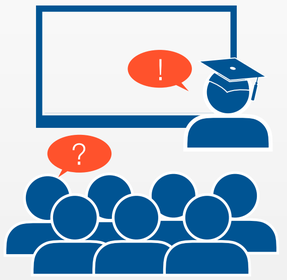
Home

- At **Home**: Learn from videos with slides at your own pace (**2.5** h/wk), work on group assignments and project (**6** h/wk)
- In **Studio**: Work on group assignments and final project with one-on-one feedback (**1–2** h/wk)
  - Attendance in studios is **required** — make sure you do not take any other classes during this time (Wed. 10–12h).
- In **Lab**: Discuss solutions and new assignments, in-class exercises (**1.5** h/wk)

Studio



Lab



Credits and Grading

- Group-oriented, project-centered
- **6** ECTS Credits
  - 20% assignments, 20% project
  - 25% midterm: **Nov. 28, 2018, 08:00–10:00** (for 60 minutes)
  - 35% final exam: **TBA** (for 60 minutes)
- To pass the course,
  - You need to pass the final exam (at least 4.0), **and**
  - Overall, you need an average grade of at least 4.0
- Further details in the lab starting on Monday, **Oct. 15, 2018** at **12:30** in **5053.2a/b**

Registering for this Class

- Limited to **100 seats** (already 102 registrations)
  - Register via RWTHonline **by the end of tomorrow** (23:59h, Thursday)
  - We will announce who's in the next day (Friday) via email
  - DIS 1 mandatory students (e.g., TK) get priority, rest will be randomized
  - B.Sc. students can take this class as elective,
    or for their future M.Sc. (for M.Sc.? then don't register, send us an email!)
- SSE, Erasmus students and others who cannot register via RWTHonline:
  Email **Adrian** (wagner@cs.rwth-aachen.de) your matriculation number and full name from your official @rwth-aachen.de email-address

Exam Registration

- No need to register for the midterm exam
- **No second chance midterm exam** unless you have a valid reason (usually requires a medical certificate)

- Deadline to register: **Thursday, Jan. 10, 2019, 23:59** (for both final exams)
  - If you fail the first final exam, there will be a short period to register for the second chance
  - B.Sc. students: you won't be registered for the second final exam automatically!
  - You can register for just the second chance final directly (not recommended)

In-Class Experiment 1: Eye Movement

- Work in pairs of 2
  - Read the paragraph handed out
  - Have your friend observe your eye movements while you're reading

Read the text on the next slide.

Afterwards you will be asked a question about the information in the text.

Press the SPACE bar once you have finished reading the text and are ready to answer the question.

Watch the video at http://www.youtube.com/watch?v=VBTZNydUh0w

In-Class Experiment 2: Bloch’s Law

A: 0 ms delay

In-Class Experiment 2: Bloch’s Law

B: 50 ms delay

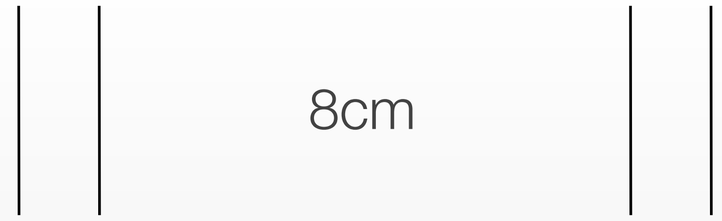
In-Class Experiment 2: Bloch’s Law

C: 100 ms delay

In-Class Experiment 3: Memory

- Digit experiment
  - Choose 5 digits secretly from your sheet, then read them to your neighbor.
  - Have her count backwards aloud from 50.
  - Have her answer some other question (like what she had for dinner 3 days ago).
  - Does she still remember the entire 5-digit sequence correctly?
- Switch roles, repeat with 9 digits.
- Finally, switching roles again, read the long sequence of numbers to your neighbor, stopping somewhere suddenly. See how many of the last numbers she can repeat (in order) immediately.

In-Class Experiment 4: Fitts' Law



Same for 0.5 cm and 2 cm wide strips

Tap for 10 s, count taps afterwards

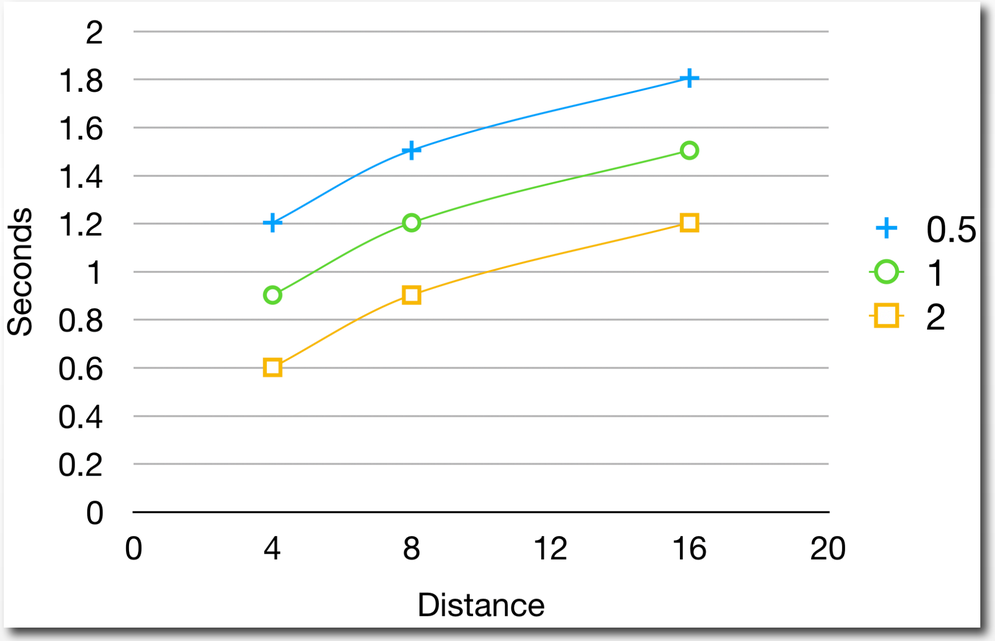
Tapping Task Results

- Doubling the distance adds roughly a constant to execution time

  ⇒ indicates logarithmic nature

- Doubling the target width (W) gives about same results as halving the distance (D)

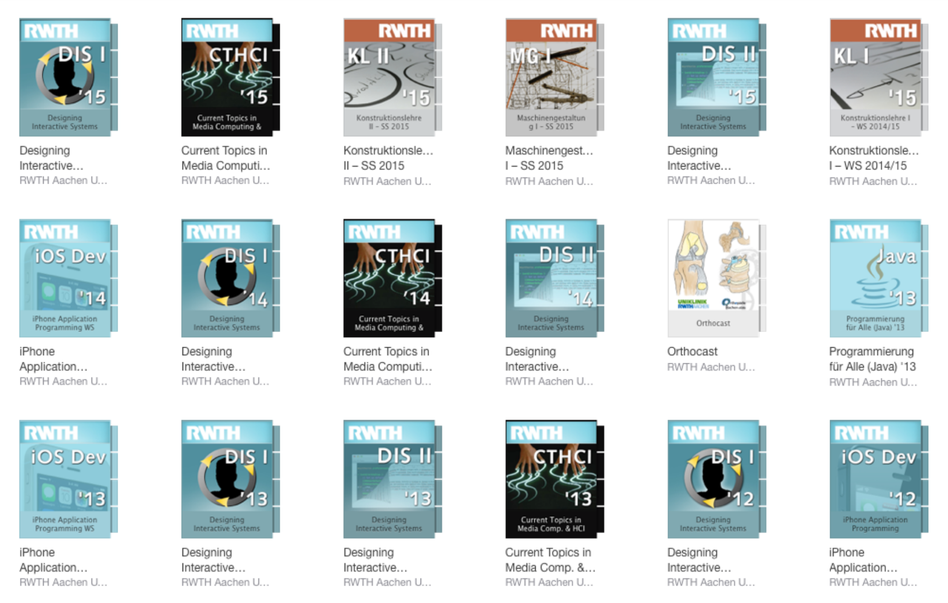
  ⇒ indicates connection of D/W in formula



Summary

- HCI is about people, technology, and design.
- This class is your ticket to our other classes, cool thesis projects, and HiWi jobs.
- You've experienced that mathematical laws seem to govern your perception, memory, and movement—watch the videos for answers!

Accessing Course Videos



▲	Name	Time	Released	Description	Popularity
1	S12 Notations Part 2	1 hr 31 min			
2	S11 GOMS, Interface Efficiency and Notatio…	1 hr 59 min			
3	S01 Introduction, CMN Model, Fitts's Law	1 hr 51 min		Introduction to the course, C…	
4	S02 Gestalt Laws, Visibility, Affordances	2 hr 19 min			
5	S03 The Seven Stages of Action, Mappings, …	1 hr 58 min			
6	S04 Knowledge in the Word and in the head,…	2 hr 16 min			
7	S05 History in HCI Part I	1 hr 31 min			
8	S06 History in HCI Part II	1 hr 38 min			
9	S07 DIA Cycle, Observing Users, Storyboards	2 hr 14 min			
10	S08 Prototyping	1 hr 33 min			
11	S09 Ten Golden Rules of Interface Design	2 hr 16 min			
12	S10 Evaluation with and without Users	2 hr 7 min			
13	Objectified	1 hr 3 min			

Total: 13 Items

Links to videos on iTunes U and Podcasts can be found on the course landing pages:

- http://hci.rwth-aachen.de/dis
- http://hci.rwth-aachen.de/ios (links will be added shortly)

What to Do Now

- **By end of tomorrow, register** for the **course** on RWTHonline—selection results will be announced this Friday.
- Also check out other classes this week—please deregister if you're not taking DIS 1!
- **Before coming to the Lab on Monday** (Oct. 15, 12:30-14:00, 5053.2a/b):
  - **Watch** videos for the first week (see the class landing page)
  - **Buy** Don Norman's *The Design of Everyday Things* (2nd edition, 2013) ***(required)***
- **Until next Friday** (Oct. 19):
  - **Read** Dix' *Human-Computer Interaction,* ch. "The Human" (pp. 11–59) (PDF will be made available on L2P by this Friday)